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ABSTRACT

The National Science Foundation has traditionally supported education in the sciences, engineering, and technology through traineeships, fellowships, grants and other awards. This year's budget will probably not allow any money for generalized traineeships, there will be a modest increase in research support, some money for fellowships and limited amounts for other projects. There will be some administrative changes in traineeships and fellowships, with an increase in the stipends and the abolishment of the dependency allowance. Educational costs are high because a larger proportion of the population is being educated at all levels in this country than anywhere else. There are too many Ph.D.'s and too many B.A.'s, while there is a shortage of mechanics. There is a great need to set up additional hierarchies of prestige to the verbal-intellectual one, with education focusing on occupational training with liberal arts subjects at the periphery. At the graduate level this means a need for different programs, such as programs for teachers of science and mathematics and programs for science practitioners. In its support for training programs, the Foundation will look for something other than training in the traditional disciplines, and university support for applied programs will be an important factor. (AF)

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THE ROLE OF THE NATIONAL SCIENCE FOUNDATION IN GRADUATE EDUCATION*

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DR. LLOYD HUMPHREYS: Thank you, Mr. Chairman.

I am going to speak very briefly about some specifics and then talk for a few minutes in more general terms about program.

I have relatively little firm information about either the '71 or the '72 budget figures for the Foundation. We do not as yet have an appropriation for fiscal '71 which, of course, started last July. The Bill that was vetoed by the President contained $511 million for the National Science Foundation, plus $2 million in

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foreign currencies.

It is my understanding that this same amount is very likely to be passed by the Congress, again, when they get around to considering a new Bill for the President's signature.

The President's budget for 1971 that went forward almost a year ago did not contain any money for new starts in generalized traineeships, the type of traineeships that you have been used to over the past several years.

The Congress did add $9.5 million, or did put in $9.5 million for traineeships. But the one firm thing that I can tell you this morning is that even if this is passed again in the form that went forward from the Congress the first time, the Office of Management and Budget will not allow us to spend $9.5 million or anything like it for generalized traineeships. Generalized traineeships are, as far as I can see, completely dead for the foreseeable future.

The $511 million for the Foundation as a whole will include some modest degree of increase for research support, which I am sure you are very much interested in, for which, however, I have no responsibility.

It does include also some money for fellowships; it includes some money for other graduate education projects, curriculum projects, special projects in graduate education, though in very limited amounts.

We are proposing to spend some of the money allocated for traineeships by the Congress for categorical traineeships that will support training in areas of urgent social need. We have had no word as yet from the Office of Management and Budget concerning their disposition of this proposal. But more later about what the categories might be and our definition of "urgent social need."

We are also proposing some changes, some administrative changes in fellowships and traineeships, if we have them. We are proposing an increase in stipends--I won't go into details because time is short--and we are proposing an increase, a modest increase in the cost of educational allowance. Since you are particularly interested in this, this will be from $2500 to $3,000.

We are abolishing dependency allowances. Contrary to the statement made Wednesday afternoon by a member of this group, I am for sin and against motherhood. (Laughter)

Actually we are putting the dependency

matter on your backs. Universities will still be allowed to supplement traineeships, if we have them, or fellowship stipends, and the determination of need can be made locally. There were other reasons, by the way, for abolishing the dependency allowances; they were difficult to administer.

We are also proposing a change in the tenure of fellowships and in the number of years of support of traineeships. This will be from four to three. The Fellow will be allowed to start--will be required to start his fellowship the succeeding year after it is awarded. He can then take the remaining two years of his fellowship at any time in the succeeding four years; a total of five years in which to have three years of fellowship support.

Trainees will be supported 100 per cent, whatever that figure may be, the first year; two-thirds of that amount will be allocated for second year traineeships and one-third for third year traineeships.

We are also proposing a single initial screening of Fellows with a subsequent screening to be done at the university level. This has come under some degree of attack, I understand. None of these are

absolutely certain at this present period of time. If you have any ideas along these lines, please let us know.

We have found that there were very relatively few changes in the evaluations of fellowship candidates as a result of a second screening and it seemed to be an expensive operation in terms of what little gain was being attained.

Now, to talk about more general matters and how we approach the matter of social need. I remind you in the first place that education is an exceedingly costly enterprise. I have seen a recent figure indicating that about 10 per cent of our Gross National Product supports education at all levels. I don't think that any proposal to increase the number of years in graduate training, as was suggested possibly last evening, is going to be a viable proposal. Somehow we are going to have to cut the cost of education rather than increase it.

Our educational costs are high because we are educating a larger proportion of our population at all levels than any other country in the world. One reason why the Soviet Union can spend more money on research, relatively speaking, is that they are not spending nearly as much money on education.

Almost 100 per cent of our population enters high school; very close to 100 per cent, something like 80 per cent is now finishing. More than half of this group will enter college and so on down the line. I do not believe that the picture painted last night by the first speaker is overdrawn. We are overproducing Ph.D's., but I would like to point out that we are also overproducing B.A's. from Liberal Arts colleges and we are overproducing, in my opinion, high school graduates who come up through the college preparatory program.

We are doing this, it seems to me, because we have a single hierarchy of occupational values and occupational prestige, and accompanying this hierarchy we have a single hierarchy of educational values and educational prestige. And both of these are related to one segment of human ability, a verbal-intellectual ability.

I suggest that we ought to take a look at this hierarchy and try to set up additional hierarchies of prestige that are, in my opinion, badly needed in our society. Let's take a look at social need.

We have a highly complex technological society. Bachelor's degree people in the liberal arts who

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are unable to find jobs in high school teaching are not going to keep a technological society running, nor are they going to be able to solve some of the environmental problems that we face today. As a matter of fact, the mechanical abilities are, in many ways, more important than the verbal abilities for a society such as ours.

In a sub-society, a highly complex one such as the Air Force, where I worked for a number of years and where I have a good deal of information about jobs and the human abilities that are related to them, high verbal ability people were a dime a dozen. You had to look hard in order to find good spots to classify them in. You put some of them out as Chaplins' assistants and other jobs of that sort--(laughter)--but they weren't really critical for the operation of the society.

The dirty hands and the clean hands mechanics were much the scarcer and much the more critical. In addition to mechanical, I think there are other dimensions that are absolutely required by a complex society for which the educational patterns are different from the traditional higher education patterns and the traditional college prep patterns, and that we had better spend some time looking for these and trying to train for them, to

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educate for them, and to try to build up their prestige to make them more attractive.

I'm saying this, incidentally, not in a class oriented sense. The kinds of people who will make good mechanics are also found among our children as well as among the children of working class parents. As a matter of fact, a good many middle class children ought to be going into mechanical and other kinds of useful training right now rather than into traditional higher education.

I make this statement in part based upon the needs of the students themselves, as I see them, needs in terms of patterns of abilities and needs in terms of patterns of interests and values.

I am not suggesting that these other kinds of education or training be devoid ~~of these other kinds of education or training be devoid~~ of the liberal arts, but I do suggest that occupational training as the focus with the traditional liberal arts subjects in the periphery is likely to lead to a better appreciation and more learning of the traditional liberal arts subjects than trying to put everyone through an educational curriculum that has as its core the traditional liberal arts.

Well, what does this mean with respect to graduate education? I think graduate education is only a small part of a picture. But this kind of reasoning does lead me to recommend, and to recommend to the Foundation for support wherever we can, the opening up of new avenues of education at the graduate level, just as I would like to open up new avenues of education at the undergraduate level and at the high school level.

The Foundation is very limited, of course, in what it can do. We are limited in terms of our charge; we support education in science and mathematics and technology. We are also limited in terms of the amount of funds we have available for this sort of thing. But I do believe we can make a good case for multiple avenues of education at all levels, including the graduate level.

I suggest in this regard that the people generally place more weight on the Ph.D. dissertation at the graduate level than it can support empirically; that there are other ways to produce a critical evaluative attitude toward research than doing a traditional Ph.D. dissertation. And we do not have to give up these attitudes if we move to other avenues of graduate education. The other avenues that we hope to be able to support

with categorical traineeships include most of those that have been discussed here in the last couple of days; new programs for teachers of science and mathematics; programs for science practitioners. Willard Libby, I believe, is talking about such people as science doctors. Not that these persons will do the research required to solve environmental problems, but will be practitioners of science, advisers and governmental units, perhaps, and industrial concerns.

I suggest, based upon the best advice that I have been able to obtain, that we need more engineers who think like engineers rather than like physicists or chemists. I further believe that we need more biologists who think like engineers and act like engineers. We do have a model here in the agricultural school; we also have a model in the public health business, but we need more biologists who think and act like engineers for other kinds of biological problems in our society.

We need more behavioral scientists who think and act like engineers rather than like pure scientists; again, to help to solve some of the pressing social problems in our society.

I am not suggesting, incidentally, that

training, research funds, training support is going to reduce to zero in the pure sciences, far from it. This is the least of my worries. I am not at all worried about the possibility that this will happen. What I am worried about is that we won't make enough of an effort in the applied direction. We don't have guidelines written as yet for a categorical traineeship program; we don't know that we are going to have one. If we do have one, the following general criteria will be used by the Foundation:

We will look at the program and not at the degree. The degree that you give or award is your business. But we will look at the program, and the program we will expect to be something other than training in the traditional disciplines, the traditional scientific disciplines.

We will also look at the setting of the program and the university support for the program. A program offered by a committee whose salaries and time of the members are taken up by their parent departments will not look as good to us as a program that has better, more effective support.

I don't think we will use the A.C.E. report in our evaluations. Not because we don't think it is a

good report for what it attempts to do, but we will apply our usual criteria; we will look at the people involved, the university setting, and the quality of the program.